

We claim:

1. A bone graft composition suitable for administration to the body via a cannula, comprising:

5 mineralized collagen particles comprising bound mineralized collagen fibrils substantially uniformly distributed there through and a binder for said fibrils; and a fluid biocompatible carrier comprising said mineralized collagen particles substantially uniformly distributed there through.

10 2. The composition of claim 1 wherein said carrier is selected from the group consisting of hyaluronic acid, succinylated collagen, carboxymethyl cellulose, gelatin, collagen gel, fibrinogen, thrombin, liquid alkyd polyesters, liquid polyhydroxy compounds and bone marrow.

15 3. The composition of claim 1 comprising a bioactive agent.

4. The composition of claim 3 wherein the bioactive agent is selected from the group consisting of bone marrow, osteogenic growth factors, genes-encoding osteogenic growth factors, cell attachment mediators integrin-binding sequence,
20 ligands, bone morphogenic proteins, epidermal growth factor, IGF-I, IGF-II, TGF- β I-III, growth differentiation factor, parathyroid hormone, vascular endothelial growth factor, lycoprotein, lipoprotein, bFGF, TGF- β superfamily factors, BMP-2, BMP-4, BMP-6, BMP-12, BMP-14, MP-52, sonic hedgehog, GDF5, GDF6, GDF8, PDGF, tenascin-C, fibronectin, thromboelastin, thrombin-derived peptides, heparin-
25 binding domains, demineralized bone matrix (DBM), platelet rich plasma, bone marrow aspirate, bone fragments, bone marrow cells, mesenchymal cells, stromal cells, stem cells, embryonic stem cells, osteoblasts, precursor cells derived from

adipose tissue, bone marrow-derived progenitor cells, peripheral blood progenitor cells, stem cells isolated from adult tissue and genetically transformed cells.

5 5. The composition of claim 3 wherein said carrier and said bioactive agent are the same.

6. The composition of claim 4 wherein said composition comprises from about 10 to about 35 weight percent of said mineralized collagen particles.

10 7. The composition of claim 6 wherein said mineralized collagen particles have an average diameter of from about 10 microns to about 1,000 millimeters.

8. The composition of claim 8 wherein said bioactive agent comprises human bone marrow.

15 9. The composition of claim 8 wherein said carrier comprises sodium hyaluronate.

20 10. The composition of claim 1 wherein said mineralized collagen particles have an average diameter of from about 10 microns to about 5 millimeters.

11. The composition of claim 1 comprising from about 1.5 to about 35 weight percent of said mineralized collagen particles.

25 12. The composition of claim 1 comprising from about 1.5 to about 7.5 weight percent of said mineralized collagen particles.

13. The composition of claim 12 wherein said mineralized collagen particles have an average diameter of from about 250 microns to about 5 millimeters.

5 14. The composition of claim 1 wherein said mineralized collagen particles are porous.

15. A method for the preparation of mineralized collagen particles, comprising:
preparing an aqueous solution of a water-soluble material suitable for use as
10 a binder for mineralized collagen fibrils,

combining said mineralized collagen fibrils with said solution under conditions effective to prepare a homogenous aqueous slurry comprising said fibrils and said solution,

combining said slurry with an oil phase to form an emulsion of said slurry in
15 said oil phase,

mixing said emulsion to form mineralized collagen particles comprising said binder material,

crosslinking said mineralized collagen particles comprising said binder material; and

20 isolating said crosslinked mineralized collagen particles from said emulsion, whereby said mineralized collagen particle comprises said mineralized collagen fibrils bound and substantially uniformly distributed there through.

16. The method of claim 15 wherein said water-soluble material comprises
25 native collagen or denatured collagen.

17. The method of claim 16 wherein said water-soluble material comprises native collagen, said slurry is adjusted to a pH within about 9 to about 13 and a surfactant is added to said emulsion prior to crosslinking said mineralized collagen particles.

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18. The method of claim 16 wherein said water-soluble material comprises denatured collagen.

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19. The method of claim 14 wherein said mineralized collagen fibrils are micronized prior to combining with said solution of said water-soluble material.

20. The method of claim 19 wherein the average diameter of said isolated particles is from about 10 microns to about 1,000 microns.

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21. The method of claim 15 wherein the average diameter of said isolated particles is from about 10 microns up to about 5 millimeters.

22. The method of claim 15 wherein said isolated particles are vacuum dried.

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23. The method of claim 15 wherein said isolated particles are dried by lyophilization.